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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/057,923	01/29/2002	Masatoshi Yasunaga	50090-470	3734

7590 01/29/2004

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EXAMINER

NGUYEN, DILINH P

ART UNIT PAPER NUMBER

2814

DATE MAILED: 01/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/057,923	YASUNAGA, MASATOSHI	
	Examiner	Art Unit	
	DiLinh Nguyen	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,7,9,10 and 12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1 is/are allowed.
- 6) ☒ Claim(s) 3,7,9,10 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. Pat. 5216278) in view of Shermer, IV et al. (U.S. Pat. 6429513).

Lin et al. disclose a semiconductor device (fig. 6, column 6, lines 11 et seq.)

comprising:

a substrate;

a semiconductor chip 18 mounted on the substrate;

external electrodes 26 and 56 provided on the back of the substrate for

connecting electrodes of the semiconductor chip to the outside;

a sealing member 36 for encapsulating the semiconductor chip on the substrate;

a heat sink plate 54 is disposed so as to be opposed to a main surface on which semiconductor elements of the semiconductor chip are formed and so as to adjoin the main surface with a thin sealing member 58 placed on the main surface being interposed therebetween, so as to be detached from the substrate; and

the heat sink plate has a broader area than the main surface of the semiconductor chip.

Lin et al. fail to disclose the heat sink plate has a concavo-convex portions and wherein the convex portions do not protrude from the surface of the sealing member to the outside.

Shermer, IV et al. disclose a heat sink 12 has concavo-convex portions formed on an exposed surface thereof and the heat sink plate is so formed that convex portions do not protrude from the surface of a sealing member 20 to the outside (fig. 1, column 2, lines 45 et seq.) to provide more efficient heat dissipation. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Lin et al. to provide more efficient heat dissipation for the package device, as shown by Shermer, IV et al.

3. Claims 7, 9-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schneider et al. (U.S. Pat. 5610442) in view of Oogaki et al. (U.S. Pat. 4621304).

Schneider et al. disclose a semiconductor device (figs. 2A and 4, column 5, lines 65 et seq.) comprising:

- a substrate 102;

- a semiconductor chip 306 mounted on the substrate;

- external electrodes 204 provided on the back of the substrate 202, for connecting electrodes of the semiconductor chip to the outside (fig. 2A);

- a sealing member 404 for encapsulating the semiconductor chip on the substrate; and

a heat sink plate 410 fixed by the sealing member, wherein the heat sink plate has a heat dissipation fin formed integrally therewith.

Schneider et al. fail to disclose the heat sink plate and the heat dissipation fin have engaging portions brought into engagement with each other, whereby the engaging portions allow detachment of the heat dissipation fin from the heat sink plate.

Oogaki et al. disclose the heat sink 7 and the heat sink 8 have engaging portions brought into engagement with each other, whereby the engaging portions allow detachment of the heat sink 8 from the heat sink 7 (cover fig., column 4, lines 1-10). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Schneider et al. to provide the engaging portions to achieve a positive cooling effect for the package device, as shown by Oogaki et al.

- Regarding claim 9, Oogaki et al. disclose the engaging portions are respectively formed at the heat sink 7 and the heat sink 8 and comprise a screw and a threaded hole brought into engagement with each other.
- Regarding claim 10, Schneider et al. disclose the heat sink plate is disposed so as to be opposed to a main surface on which semiconductor elements of the semiconductor chip is formed.
- Regarding claim 12, Oogaki et al. disclose the engaging portions are respectively formed at the heat sink 7 and heat sink 8 and comprise a screw and a threaded hole brought into engagement with each other.

REASONS FOR ALLOWANCE

Claim 1 is allowed.

The following is an examiner's statement of reasons for allowance:

Fernandez et al. fail to disclose the combination of all the limitations recited, including the heat sink plate has concavo-convex portions formed on an exposed surface thereof and to be detached from the substrate.

Shermer, IV et al. fail to disclose the combination of all the limitations recited, including the heat sink plate is disposed to make direct contact with a main surface on which semiconductor elements of the semiconductor chip are formed and the heat sink plate has a broader area than the main surface of the semiconductor chip.

Therefore, the claimed invention is not shown in the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 11/6/03 have been fully considered but they are not persuasive.

The Applicant argues that Lin et al. disclose the thermal coupling layer 58 provided between the heat spreader 54 and the electronic component 18 differs from molded package body 36. This significant difference between the claimed semiconductor device and the device disclosed by Lin et al. is functionally significant.

The Examiner disagrees.

The claimed invention discloses a heat sink plate is disposed so as to be opposed to a main surface on which semiconductor elements of the semiconductor chip are formed and so as to adjoin the main surface with a thin sealing member placed on the main surface being interposed therebetween.

The claimed invention fails to disclose a thin sealing member differs from a sealing member or a thin layered portion of a sealing member being interposed therebetween.

Lin et al. disclose a sealing member 36 for encapsulating the semiconductor chip on the substrate;

a heat sink plate 54 is disposed so as to be opposed to a main surface on which semiconductor elements of the semiconductor chip are formed and so as to adjoin the main surface with a thin sealing member 58 placed on the main surface being interposed therebetween. Therefore, Lin et al. disclose the claimed invention.

In response to applicant's argument that it is not obvious to combine the references, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case:

Schneider et al. fail to disclose the heat sink plate and the heat dissipation fin have engaging portions brought into engagement with each other, whereby the engaging portions allow detachment of the heat dissipation fin from the heat sink plate.

Oogaki et al. disclose the heat sink 7 and the heat sink 8 have engaging portions brought into engagement with each other, whereby the engaging portions allow detachment of the heat sink 8 from the heat sink 7 (cover fig., column 4, lines 1-10). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Schneider et al. to provide the engaging portions to achieve a positive cooling effect for the package device, as shown by Oogaki et al.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

Art Unit: 2814

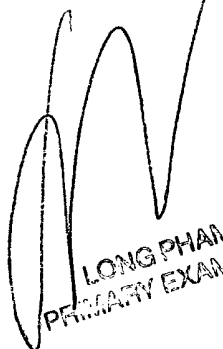
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN
January 22, 2004


LONG PHAM
PRIMARY EXAMINER